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June 11, 2004

Via Federal Express

Ms. Lynda L. Dorr
Secretary to the Commission
Public Service Commission of Wisconsin
610 North Whitney Way, P.O. Box 7854
Madison, WI 53707-7854

Dear Ms. Dorr:

Plains-Amberg-Stiles-West Marinette Project

Pursuant to Wis. Stat. §196.49 and Wis. Admin. Code §§ PSC 112.05, 112.06, and PSC 4.10(2), American Transmission Company LLC and ATC Management Inc., its corporate manager (known collectively as American Transmission Company or ATC) applies for a Certificate of Authority and any other authorization needed to upgrade, install, operate and maintain transmission system facilities to improve the reliability and relieve constraints of the transmission supply system in the northern half of its service territory.

Wisconsin Construction. Construction activity is planned for Oconto and Marinette counties. ATC seeks authorization to rebuild the existing 65-mile, 138 kV double-circuit transmission line between Plains, Amberg, Crivitz, and Stiles substations on the existing right-of-way to improve reliability and address transmission service needs. The existing steel lattice tower line would be removed and replaced with double circuit steel poles and T-2 477 ACSR conductor. Amberg Switching Station would also be rebuilt to replace aged facilities and expanded to serve the nearby Dave's Falls distribution substation. ATC also seeks authorization to reconductor the Amberg-White Rapids 138 kV transmission circuit to increase its capacity.

The Plains-Stiles facilities are located predominately in Wisconsin, except the northernmost 2.6 miles of line, which is in Michigan, plus terminal upgrade work at Plains Substation in Michigan. Approximately 0.1 mile of the 8.7-mile Amberg-White Rapids circuit at the Menominee River is located in Michigan.

Michigan Construction. ATC is also notifying the Commission about related construction planned for Dickinson and Menominee counties in Michigan. ATC proposes to rebuild the White Rapids-Grand Rapids-Bay De Noc-Menominee-West Marinette 69 kV transmission facilities for 138 kV operation on the existing right-of-way to address facilities condition and improve reliability.

This rebuild would also establish a transmission service path while the Amberg-Stiles segment is being rebuilt. Transmission line construction would involve installation of T2 477 kcmil ACSR conductor on a combination of steel and wood poles. The Menominee-West Marinette segment would be rebuilt using double-circuit steel poles so that the West Marinette-Menominee 69 kV circuit will continue to serve Menominee substation. White Rapids Substation would also be rebuilt at a new location. ATC is presently seeking a site in Wisconsin or Michigan.

The transmission facilities are located predominately in Michigan, although 3.6 miles of the 13.3-mile White Rapids-Grand Rapids line and 3.8 miles of the 7.8-mile Menominee-West Marinette line are located in Wisconsin.

Application. The application addresses the facilities in both Wisconsin and Michigan in order to present the complete scope of the proposed construction.

An electronic copy of the application was submitted via the PSCW's Electronic Regulatory filing System (ERF) on June 8, 2004.

An original and two copies of ATC's application are enclosed. Copies are also enclosed for use by Commission staff for a total of six copies.

Hard copies of the Wetland Inventory and USGS maps will be sent to the Commission under separate cover.

If there are any questions concerning this application, please contact Ms. Elizabeth Gehrt, Regulatory Project Manager, at 262-506-6747 (email: eghert@atcllc.com) or me at 262-506-6845 (sparker@atcllc.com).

Very truly yours,

Stephen Parker

Stephen Parker
Manager, State Regulatory Affairs

Enclosure

cc: Scot Cullen, PSCW
Paul Rahn, PSCW
Dave Siebert, WDNR
Udaivir Sirohi, PSCW

A. Introduction and Overview

American Transmission Company LLC and ATC Management Inc., known collectively as American Transmission Company (ATC), as Wisconsin public utilities, pursuant to the requirements of Wis. Stat. §§ 196.49 and Wis. Admin. Code §§ PSC 112, hereby apply for a Certificate of Authority and any other approvals necessary to install electric transmission-related facilities as more fully described in the accompanying Technical Support Document.

ATC owns and operates transmission facilities and transacts business as a transmission company with the sole purpose of planning, constructing, operating, and maintaining the transmission facilities to provide transmission service to transmission users. ATC is obligated to provide adequate and reliable energy transmission that meets the needs of all transmission users in the areas it serves and that supports effective competition in energy markets without favoring any market participant.

Transmission facilities that are the subject of this application providing service to the northern portion of ATC's system are located in Oconto and Marinette counties in the state of Wisconsin, and in Dickinson and Menominee counties in the state of Michigan. The deficiencies in facility condition and capability of portions of these facilities have become so severe that failures of these facilities have resulted in impacts ranging from service curtailments to blackouts affecting portions of northeastern Wisconsin and Michigan's Upper Peninsula.

This situation is one of the most critical system performance issues on ATC's transmission system, and in response, ATC is proposing an aggressive facilities rebuild project. The reconstruction of a portion of these facilities is the subject of this application. ATC has designated the project to rebuild the affected transmission facilities as the Plains-Amberg-Stiles-West Marinette Project (Project).

For a detailed description of how this project fits with the other system reinforcements, please refer to "The Northern Interface" document in Appendix B, Exhibit 1.

<u>Performance Issues, History and Project Development.</u>

ATC has analyzed the vulnerabilities and constraints on this portion of the transmission system and has determined that several transmission system reinforcements are needed. One of these reinforcements focuses on rebuilding the Plains-Amberg-Crivitz-Stiles double circuit 138 kV line for greater capacity and reliability.

Since ATC's first 10-Year Transmission System Assessment (June 2001), performance issues with heavily-loaded and aging 138 kV transmission facilities in the northern portion of ATC's system have been identified. In the most recent 10-Year Transmission System Assessment (September 2003), the impact of these facilities on ATC's ability to meet transmission service needs, resulting in uneconomic dispatch of generating units, was noted. In ATC's update to that assessment (issued in March 2004), the performance issues with the Plains-Stiles line were reviewed, and ATC's plan for addressing this situation was outlined.

Project Summary

This Project addresses the most limiting transmission system elements to transmission service in the northern portion of ATC's system. Because of the critical nature of the Plains-Stiles line, it cannot be removed from service to be uprated without severely jeopardizing ATC's ability to provide needed transmission service, especially to the Upper Peninsula of Michigan. Various energized and de-energized rebuild and reconductor options to uprate the line were evaluated.

Based on these evaluations, the most prudent method to uprate this line is to completely rebuild it. Replacement of structures and the use of larger conductors will improve reliability and enable ATC to meet requests for transmission service, and it will improve both emergency transfer capability and voltage stability limits. Further, rebuilding will maximize the use of existing transmission line right-of-way. In order to minimize the outage risks associated with keeping the line energized during construction, the construction plan discussed below provides the best combination of construction methods and facility upgrades to help meet area needs.

ATC proposes to rebuild the existing 65-mile, double-circuit, 138 kV transmission line from Plains to Amberg to Crivitz to Stiles substations. To facilitate rebuilding the Amberg-Crivitz-Stiles segment and to address separate facility condition and reliability needs, ATC also proposes to reconductor the 138 kV transmission line between Amberg and White Rapids substations and to rebuild the existing 69 kV transmission line between White Rapids and West Marinette substations for 138 kV operation. The line facilities addressed in the Project range in age from 34 to 79 years.

B. Purpose and Necessity for the Project

The Plains-Stiles transmission line is a critical link in the northern portion of ATC's transmission system. This line, along with the Plains-Morgan 345 kV line, are the links between the transmission networks in northeast Wisconsin and the Upper Peninsula of Michigan. As such, whenever the Plains-Morgan line is out of service, the transmission networks are linked by only the much lower capacity Plains-Stiles line which is nearly 80 years old. This situation raises reliability concerns and causes transmission service limitations.

To overcome these constraints, ATC must redispatch certain limited generating facilities, which is costly to ATC's transmission customers, and which is further hampered by limited generating facilities available that are effective in relieving the constraints on the transmission system[1]. As noted in the Section A above, several transmission system reinforcements will be needed to address these constraints.

Urgent Transmission Service and Facility Condition Needs

The Project will address two urgent needs for ATC and its customers: (1) improve the reliability of the system serving northeast Wisconsin and the Upper Peninsula of Michigan by replacing aged facilities and (2) alleviate transmission system constraints on the Plains-Stiles segment of the transmission system that severely restrict transmission service in the northern portion of ATC's transmission system.

Condition of Facilities. The Plains-Stiles line is 79 years old and is past its useful service life. The typical expected service life for phase conductor, shield wire and insulators is 60 years. With the exception of new insulation on the Plains-Amberg segment in the early 1990s, the balance of the facilities are 79 years old. Other than lightning-induced outages (poor shielding angle and marginal insulators), the most prevalent failure mode has been shield wire failures. The shield wire is rusted in many areas, resulting in reduced strength. When shield wire failures occur, there is a public safety risk if the wire falls through to the ground as there is no observable outage until the failure is observed on patrol or a member of the public notifies ATC. There is also a risk of contact with an energized conductor, resulting in a line trip and possible conductor damage. This situation could also present a public safety hazard.

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[1] When transfers between Wisconsin and Michigan approach or reach security limits, ATC must declare the need for transmission loading relief (TLR) and redispatch generation. The number of TLRs related to transfers between Wisconsin and Michigan have totaled 85, 155 and 153 in years 2001, 2002 and 2003, respectively. The cost of generation redispatch in these years has been approximately $2 million, $3 million and $5 million, respectively.

Since becoming responsible for operation of this line in January 2001, ATC has experienced several events that have resulted in reduced capability or interruptions of service to the northern portion of ATC's system, especially the Upper Peninsula of Michigan. Two occurred in recent months.

- In January 2004, the shield wire failed on the Amberg-Stiles segment of the Plains-Stiles line. Although the wire did not fall into either of the energized transmission circuits, it did contact a distribution circuit causing this circuit to trip out of service. Because of the brittle condition of the shield wire, both transmission circuits had to be taken out of service so that repairs could be made safely. Generation redispatch and curtailment of some firm transmission transactions were required.

- In December 2003, both circuits of the Pulliam-Stiles 138 kV double-circuit line tripped out of service, resulting in a blackout in northeast Wisconsin and the western/central portions of the Upper Peninsula of Michigan. Although numerous line patrols by foot, climbing, and helicopter were unable to determine the cause of the trips, this outage demonstrates the vulnerability of the transmission system serving the area. The Plains-Stiles line is of similar vintage to the Pulliam-Stiles line, and its failure could result in a similar blackout situation.

Finally, the typical expected service life for steel lattice towers, such as those used for the Plains-Stiles line is about 80 years, an age nearly reached by the Plains-Stiles line. The above ground portion of such structures can be visually inspected for condition. However, the technology is not fully developed to survey the condition of below grade foundations. Because of the limitations for foundation surveys and the age of the structures, there is some concern for the structural integrity of the existing Plains-Stiles transmission towers.

Transmission Service Constraints. The power transfer limits imposed by the 1920s vintage Plains-Stiles line on ATC's ability to meet transmission service requests have become chronic. The line conductors are 4/0 AWG ACSR and are capable of supporting only 112 MVA per circuit under summer emergency conditions. This is not adequate for the transmission service demands being placed on these facilities. The need for ATC to invoke Transmission Loading Relief (TLR) measures on the Plains-Stiles line has grown steadily in recent years (95 events in 2001 to 153 in 2003). Since 2002, the Plains-Stiles line has been the most chronic limitation on the ATC system.

When a TLR is invoked, the redispatch of generation is the first option used to address the transmission constraint. This is costly for ATC's customers, increasing the cost of service to their retail customers, because generating units must be run out of economic dispatch order. Redispatch costs on the Plains-Stiles segment of the transmission system are the highest of any on the entire ATC system.

If generation redispatch proves insufficient, then ATC is forced to either curtail or interrupt firm transmission service to customers in order to reduce line loadings to within safe operating limits. Under most circumstances, this results in loads being interrupted, which typically impacts retail businesses and other large retail customers served by ATC's customers. If curtailing or interrupting firm transmission service still does not resolve the constraint, the last measure available to system operators is to invoke controlled, rolling blackouts. A description of the constraints and the effect of the needed reinforcements are provided in Appendix B, Exhibit 1, and graphically Figures 1 to10 in Appendix B, Exhibit 1a.

The Plains-Amberg-Stiles-West Marinette project is the first in a series of projects proposed by ATC to improve reliability and help relieve constraints on the northern portion of its transmission system. Without the line in-service, transmission service is severely limited. As such, rebuilding the line has been planned in such a way as to provide a 138 kV path at all times.

In summary, the rebuild of the Plains-Amberg-Stiles and Amberg-West Marinette lines is necessary for ATC's long-term plan to improve reliability and address transmission service limitations.

C. Rebuilding Requirements

Because of the duration and complexity of the proposed work, ATC has organized its work scope into two phases, as summarized below. The work scope is discussed in greater detail in the Technical Support Document included in this Application.

Phase 1: Plains-Amberg-West Marinette (2004-2005)

Plains-Amberg: Install a single-circuit temporary bypass line (constructed within the existing transmission line right-of-way). Remove the existing 22-mile, 138 kV double-circuit transmission line (4/0 AWG ACSR conductor, shield wire, and 1925-vintage lattice steel towers), and construct a new 138 kV double-circuit transmission line (T-2 477 kcmil ACSR conductor on weathering steel poles) on the existing right-of-way centerline. Remove the temporary bypass line.

Amberg Switching Station. Replace terminal equipment (breakers, jumpers, hardware, etc.) and the bus tie breaker with new breakers rated for 2000 amps. Expand the station 120 feet to the south (on ATC property) to provide space for the 138/69 kV transformer to serve Dave's Falls distribution substation and for a future WPS distribution substation. Rebuild the balance of the station facilities (strain bus, various switches, wireways, relay panels, etc.) due to their age and install a new control house.

Amberg-West Marinette 69 kV to 138 kV Line Conversion. Reconductor/ rebuild the facilities described below.

Amberg-White Rapids Line. Reconductor the existing, 8.7-mile, 138 kV circuit between Amberg Switching Stations and White Rapids Substation with T2 477 kcmil ACSR conductor. The tower line presently supports two circuits. Remove the existing 69 kV circuit (serves Dave's Falls distribution substation) from the double-circuit tower line and string the new 138 kV conductor on the three highest tower arms.

Amberg-Dave's Falls 69 kV Line. Reconnect the 69 kV line serving Dave's Falls distribution substation to a new 138/69 kV transformer at Amberg Switching Station.

White Rapids Substation. Construct a 4-position, 138 kV ring bus at a new switching station location to provide additional reliability and operational flexibility. Terminate lines from the Chalk Hills hydro-generator, Amberg Switching Station, Ingalls Substation (a new WPS distribution substation to replace the Grand Rapids Substation), and White Rapids hydro-generator at the new White Rapids Switching Station.

White Rapids-Menominee Line. Rebuild the existing single-circuit 69 kV transmission line between White Rapids and West Marinette substations (White Rapids-Grand Rapids-Bay De Noc-Menominee-West Marinette, approximately 36 miles long) for 138 kV operation utilizing T-2 477 kcmil ACSR conductor, primarily on weathering steel poles.

Grand Rapids/Ingalls Substation. Upgrade the two existing 69 kV terminals to 138 kV line terminals. Wisconsin Public Service Corporation plans to construct a new, jointly-owned substation at the existing Grand Rapids Substation site. The new substation would be named Ingalls Substation, and the Grand Rapids Substation would be retired.

Menominee-West Marinette Line. Replace the existing 69 kV transmission line between West Marinette and Menominee substations with a double-circuit 138/69 kV transmission line using steel monopole structures. Install the new 138 kV circuit on one side of the structures and transfer the existing 69 kV circuit to the other side. At West Marinette Substation, add a line terminal for the new 138 kV line from Ingalls Substation, and reconnect the relocated 69 kV circuit that will continue to serve Menominee Substation. At Menominee Substation, reconnect the relocated 69 kV circuit from West Marinette Substation.

Phase 2: Amberg-Stiles (2005-2006)

After completion of Phase 1 construction activities described above, rebuild both circuits of the 43-mile, 138 kV double-circuit transmission line from Amberg to Crivitz to Stiles substations with T-2 477 ACSR conductor on new double-circuit steel poles. This work will be done with the line de-energized because the reconstructed Amberg-West Marinette transmission facilities will provide a bypass path for transmission service during construction.

D. Project Cost

American Transmission Company estimates the total gross cost of the all of the work to be **$68,752,900**. Cost estimates are expressed in year-of-occurrence dollars. The cost of the project will be met from internal sources and/or the issuance and sale of securities.

E. Construction Schedule

Design engineering, material procurement, and right-of-way activities will precede construction and will commence upon receipt of the Commission's order. Construction is scheduled to begin in fall 2004 and to be completed by June 2007.

F. Entities Affected by the Project

Several state, regional and local units of government are affected by this project. Appropriate permits will be obtained prior to installation of the new facilities as discussed in Section 5.5 of the TSD.

G. Environmental Impact Information

In accordance with Wis. Admin. Code § PSC 4.10(3), Table 3, rebuilding the Plains-Amberg-Stiles/Amberg-W. Marinette transmission lines is a Type III action. ATC's discussion of the environmental impacts of the project is set forth in Sections 2.0 and 4.0 of the TSD.

H. Property Owners Affected by the Project

The listing of property owners affected by the proposed construction is provided in Appendix D. ATC plans to mail notification letters to all the property owners along the transmission line that have been identified. Notification will take place prior to any work starting in the field.

I. Conclusion

Based on the material contained in this application, the attached Technical Support Document, the permit application to the DNR, and any subsequent material requested by the Commission or its staff, relative to this application, American Transmission Company LLC and ATC Management Inc. request that the Commission issue a Certificate of Authority to construct the transmission facilities as described and in the manner set forth.

Respectfully submitted this 8th day of June, 2004.

American Transmission Company LLC and ATC Management Inc.

Stephen Parker

Stephen Parker
Manager, State Regulatory Affairs
ATC Management, Inc.

5.00 ENGINEERING INFORMATION

Introduction

The information provided in this section describes the proposed transmission system improvements necessary to address constraint, reliability and facility condition issues in portions of American Transmission Company's transmission system facilities located in Oconto and Marinette counties in Wisconsin, and in Dickinson and Menominee counties in Michigan. The affected facilities provide transmission service to the northern portion of ATC's transmission system. Please refer to Appendix A, Figure 1 (System Configuration).

The deficiencies in facility condition and capability have become so severe that failures have resulted in impacts ranging from service curtailments to blackouts affecting portions of northeastern Wisconsin and Michigan's Upper Peninsula. This situation is one of the most critical system performance issues on ATC's transmission system, and ATC is proposing an aggressive facilities rebuild project in response.

Project Summary

ATC has designated the project to rebuild the affected transmission facilities as the Plains-Amberg-Stiles-West Marinette Project (Project). The age of the lines addressed in the Project range in age from 34 to 79 years.

ATC proposes the following plan of action:

- Rebuild the existing 65-mile, double-circuit, 138 kV transmission line from Plains to Amberg to Crivitz to Stiles substations.
- To facilitate rebuilding the Amberg-Crivitz-Stiles segment and to address separate facility condition and reliability needs, ATC also proposes the following:
  - Reconductor the 138 kV transmission line between Amberg and White Rapids substations, and
  - Rebuild the existing 69 kV transmission line between White Rapids and West Marinette substations for 138 kV operation.

Phased Construction Approach

The Plains-Stiles line is a critical element in providing reliable transmission service for ATC's customers. Because the design of the line and the critical role of its operation, it is very difficult to take the line out of service for

rebuilding and still render reliable transmission service. The two-phased construction approach described below is the most effective:

Plains-Amberg Segment. To permit the rebuilding of the northern one-third of the Plains-Amberg-Crivitz-Stiles line (Plains-Amberg segment, approximately 22 miles long, 2.6 miles in Michigan), ATC proposes to construct a temporary single-circuit 138 kV bypass to maintain continuity of service while the existing line is rebuilt. The temporary line would be constructed using separate single-pole structures within the existing right-of-way. This approach will permit the existing double-circuit, steel lattice tower line to be de-energized and then rebuilt on the same right-of-way centerline.

Amberg-Crivitz-Stiles Segment. To permit the rebuilding of the southern two-thirds of the Plains-Stiles line (Amberg-Crivitz-Stiles segment, approximately 43 miles long), ATC proposes to first reconductor/rebuild its transmission facilities between Amberg and West Marinette substations (Amberg-White Rapids 138 kV line, approximately 9 miles long, and the 69 kV White Rapids-Grand Rapids-Bay De Noc-Menominee-West Marinette line, approximately 36 miles long) for 138 kV operation. In combination with the two 138 kV circuits between West Marinette Substation and the Stiles Substation area, this approach will provide a 138 kV path for transmission service between Amberg and Stiles substations through West Marinette Substation. As a result, the Amberg-Crivitz-Stiles line can be removed from service for rebuilding on the same centerline.

The reconductor/rebuild of the Amberg-West Marinette transmission facilities has the additional benefit of also addressing the needed upgrade of these facilities due to age and condition. ATC previously identified these facilities as likely requiring reconstruction within the next ten years. With the work scope proposed in this Application, the maintenance schedule has been advanced and modified, which will further minimize the risk of outages and facilitate the proposed construction. In addition, this work will offset an estimated $4.1 million in cost of constructing a temporary bypass line between Amberg and Stiles substations to permit the de-energized rebuild of this line segment (based on the $2.1 million estimate for the Plains-Amberg bypass line).

Substations related to the transmission lines also would be upgraded as discussed later in this document to match the new capability of the lines. The Plains, Amberg, Crivitz, Rosebush, and Stiles are transmission substations owned by ATC. Grand Rapids, Bay De Noc, Menominee and West Marinette are joint-use substations owned and operated by Wisconsin Public

Service Corporation (WPS) in which ATC has operating rights. White Rapids Substation is jointly-owned by Wisconsin Electric Power Company (d/b/a We Energies) and ATC.

The Commission's "Information Requirements for Electric Transmission Construction Projects," Version 3/20/2002 (Part 5.00), addresses transmission line and substation projects requiring a Certificate of Public Convenience and Necessity (CPCN). It has been used as the basis for the information supplied in the application to provide a consistent format for review by Commission staff. The format of Part 5.00 has been modified where appropriate to conform to the requirements of a Certificate of Authority (per Wis. Admin. Code § PSC 112.06) rather than a CPCN.

5.01-5.02 Type, Size and Location of Line Construction

The subject facilities are located in Oconto and Marinette counties in Wisconsin, and in Dickinson and Menominee counties in Michigan. Appendix B, Figure 0 shows the existing route of the transmission lines to be rebuilt.

a. Overview

System Performance

Impact of Facility Overloads. The two primary transmission service paths for the northern portion of ATC's transmission system are: (1) the 65-mile, Plains-Amberg-Crivitz-Stiles double-circuit 138 kV transmission line and (2) the Morgan-Plains single-circuit 345 kV transmission line. (See Appendix A, Figure 1.) These are critical components of the area's transmission system. Presently, under certain contingency situations, an outage of the Morgan-Plains 345 kV line (or an outage of the two 138 kV lines connected to Morgan Substation), during times of high transmission service demands, results in low voltages and an overload of both circuits of the 138 kV Plains-Stiles line. Because of its limited capacity, the Plains-Stiles line also has the highest incidence of transmission loading relief (TLR) events within the ATC system. These operational limitations are normally addressed through the redispatch of the generation sufficient to overcome the constraint.

In the event that generation redispatch is not adequate to relieve the high loading on these facilities, ATC is forced to either curtail or interrupt firm transmission service to customers in order to reduce line loadings to within safe operating limits. Under most circumstances, this results in the

transmission customers reducing or interrupting their respective retail customers to reduce transmission service utilization.

The redispatch and curtailment/interruption options both have negative impacts. Redispatch costs on the Plains-Stiles segment of the transmission system are the highest of any on the ATC system. Curtailing or interrupting firm transmission service effectively transfers the inconvenience and cost directly to retail customers. Curtailing or interrupting firm transmission service is the next-to-last step available to system operators—the last step being controlled, rolling blackouts.

System Blackouts. Whether the result of a controlled response to system conditions or the result of critical facilities failure, a blackout can have serious consequences. Not only are customers inconvenienced, but the impact on the affected area can adversely affect public safety, education, individual activities, and the economy of the area.

Phased Work Scope

Because of the duration and complexity of the proposed work, ATC has organized its work scope into two phases, as described below. The actual sequence of construction is described in Section 5.01-5.02.c later in this document. The sequence of work activities will have to be adjusted if ATC needs to perform construction on energized circuits in order to meet its aggressive schedule.

During line rebuilding, the conductor, shield wires and hardware would first be removed from the existing double-circuit steel lattice and single-circuit wood pole structures, and then the structures would be removed. Next, the replacement facilities would be constructed using a combination of primarily new double-circuit weathering steel poles, as well as some single round wood poles and some laminated wood poles, depending on the installation situation. The new poles, conductor, and shield wires would be installed in the same transmission line right-of-way along the same centerline as the existing line.

Phase 1: Plains-Amberg-West Marinette (2004-2005)

Plains-Amberg 138 kV Line. Install a temporary bypass line parallel to the existing Plains-Amberg line segment. Once the temporary line is constructed and energized, remove the existing facilities. Finally, rebuild both circuits of the 22-mile, 138 kV double-circuit transmission line between Plains Substation and Amberg Switching Station with T-2 477 kcmil ACSR conductor on new double-circuit steel poles. This approach

will maintain continuity of the critical transmission service path and will maximize safety during the construction process.

The new double-circuit 138 kV structures to be installed for Plains-Amberg are shown in Appendix C, Drawing 1. The temporary line will be a single-circuit configuration on wood pole structures utilizing horizontal line post insulators. A typical structure drawing is provided in Appendix B, Figure 7 and 8.

ATC also plans to increase the terminal equipment capability at Plains Substation and Amberg Switching Station to a 2000-amp rating.

Amberg Switching Station. Replace terminal equipment (breakers, jumpers, hardware, etc.) and the bus tie breaker with new breakers rated for 2000 amps. Expand the station 120 feet to the south (on ATC property) to provide space for the 138/69 kV transformer to serve Dave's Falls distribution substation and for a future WPS distribution substation. A 138 kV bus and a deadend structure for the Amberg-White Rapids 138 kV line will also be installed. Rebuild the balance of the station facilities (strain bus, various switches, wireways, relay panels, etc.) due to their age and install a new control house.

Amberg-West Marinette 69 kV to 138 kV Line Conversion. The lines described below will be reconductored and/or rebuilt. Since each affected substation is supplied by two lines, and only one will be out of service at any time, continuity of service will be maintained.

The following steps in the work plan involves the most aggressive portion of the Project schedule. Construction in multiple line segments will need to be performed at the same time in order to complete construction by summer 2005. Construction on energized circuits may be needed to compress the overall construction time period in order to minimize the potential risk to the remainder of ATC's transmission system.

Amberg-White Rapids Line. Reconductor the existing, 8.7-mile, 138 kV circuit between Amberg and White Rapids substations with T2 477 kcmil ACSR conductor. The tower line presently supports two circuits. The existing 69 kV circuit (White Rapids/Rosebush to near Amberg Switching Station) will be removed. The new 138 kV conductor will be strung on the three highest tower arms to provide the required ground clearance.

Amberg-Dave's Falls 69 kV Line. Reconnect the 69 kV line serving Dave's Falls distribution substation to a new 138/69 kV transformer at Amberg Switching Station. The existing 69 kV line to Dave's Falls Substation presently crosses ATC's property where the Amberg Switching Station is located. The line from Dave's Falls Substation will be rerouted into the expanded section of Amberg Switching Substation.

White Rapids Substation. Construct a 4-position, 138 kV ring bus at a new switching station location to provide additional reliability and operational flexibility. Terminate lines from the Chalk Hills hydro-generator, Amberg Switching Station, Ingalls Substation (a new WPS distribution substation to replace the Grand Rapids Substation), and White Rapids hydro-generator at the new White Rapids Switching Station. The proposed construction is described in greater detail in Section 5.01-5.02.c (Major Work Items).

White Rapids-Menominee Line. Rebuild the existing single-circuit 69 kV transmission line between White Rapids and West Marinette substations (White Rapids-Grand Rapids-Bay De Noc-Menominee-West Marinette, approximately 36 miles long) for 138 kV operation utilizing T-2 477 kcmil ACSR conductor, primarily on weathering steel poles. The selection of pole type to be used will be based on consultation with local residents, terrain conditions and availability of pole material.

Grand Rapids/Ingalls Substation. Upgrade the two existing 69 kV terminals to 138 kV line terminals. Wisconsin Public Service Corporation plans to construct a new, jointly-owned substation at the existing Grand Rapids Substation site. The new substation would be named Ingalls Substation, and the Grand Rapids Substation would be retired.

ATC plans to first energize the reconductored 138 kV line from Amberg Switching Station to White Rapids Substation. Then the rebuilt line from White Rapids Substation to Ingalls Substation will be energized at 138 kV. When Ingalls Substation is energized, WPS distribution load will be transferred from Grand Rapids Substation to Ingalls Substation. Next, the remaining Grand Rapids 69 kV line from the WPS Bay de Noc Substation will be de-energized, and the Bay De Noc load will be bridged to other sources. Finally, the 69 kV line facilities west of Ingalls will be removed.

The new West Marinette-Ingalls 138 kV line will be built on the existing 69 kV line centerline. At Ingalls Substation, two corner structures will be installed to turn the 138 kV line into the substation deadend structures.

Menominee-West Marinette Line. Replace the existing 69 kV transmission line between West Marinette and Menominee substations with a double-circuit 138/69 kV transmission line using steel monopole structures (same design as for the Plains-Amberg-Crivitz-Stiles line). Install the new 138 kV circuit on one side of the structures and transfer the existing 69 kV circuit to the other side. At West Marinette Substation, add a line terminal for the new 138 kV line from Ingalls Substation, and reconnect the relocated 69 kV circuit that will continue to serve Menominee Substation. At Menominee Substation, reconnect the relocated 69 kV circuit to West Marinette Substation. All substation work will be done within the existing station fence line.

Phase 2: Amberg-Stiles (2005-2006)

After completion of Phase 1 construction activities described above, rebuild both circuits of the 43-mile, 138 kV double-circuit transmission line from Amberg to Crivitz to Stiles substations with T-2 477 ACSR conductor on new double-circuit steel poles. This work will be done with the line de-energized because the reconstructed Amberg-West Marinette transmission facilities will provide a bypass for transmission service during construction.

In addition, ATC plans to uprate the terminal equipment at Crivitz and Stiles substations to 2000-amp thermal capability.

b. Easements

In Wisconsin, all proposed transmission line construction in this Project will be within existing rights-of-way. In Michigan, with the possible exception of the area in the immediate vicinity of the new Ingalls Substation, all proposed transmission line construction will take place within existing right-of-way. As discussed above, construction of the new White Rapids substation is planned on a new parcel of land presently being sought.

c. Major Work Items

The construction proposed in this Application would be done in two major construction phases involving numerous construction stages. Phase 1 (2004 to 2005) involves rebuilding the Plains-Amberg line, reconductoring the Amberg-White Rapids 138 kV line, and rebuilding the White Rapids-Grand Rapids/Ingalls-Bay De Noc-Menominee-West Marinette 69 kV line for 138 kV operation.

Phase 2 (2005 to 2006) involves rebuilding the Amberg-Crivitz-Stiles 138 kV line. The order of construction within each phase is discussed below.

Phase 1 Construction

Phase 1 construction involves three stages (groups of construction steps). Stages 1 and 2 are targeted for completion by June 2005.

Phase 1, Stage 1. The following construction steps will be performed together in the first construction phase with many steps being performed simultaneously:

- Plains-Amberg 138 kV Temporary Bypass Line: Install a single-circuit temporary bypass line (constructed within the existing transmission line right-of-way, but offset 40 feet from the right-of-way centerline).

- Amberg Switching Station Bypass: Install temporary bypass connections at Amberg Switching Station so the station may be de-energized for rebuilding.

- Amberg Switching Station Rebuild: The terminal equipment (breakers, jumpers, hardware, etc.) at Amberg Switching Station for four 138 kV lines (connecting to Stiles, Plains and White Rapids substations) and the bus tie breaker will be replaced with new breakers rated for 2000 amps. To maintain compatibility with the other substation breakers, the breaker needed for the 138 kV terminal addition at West Marinette Substation will be installed at Amberg, and the Amberg breaker for line 60841 (Amberg-Crivitz) will be moved to West Marinette.

Amberg Switching Station will also be expanded 120 feet south on ATC property. (See Appendix B, Figures 9 and 10.) This will provide space for the 138/69 kV transformer to serve Dave's Falls distribution substation and for a future WPS distribution substation. A 138 kV bus will be installed with a breaker for the Dave's Falls transformer. A deadend structure for the Amberg-White Rapids 138 kV line also will be installed.

ATC also plans to take advantage of the station outage to rebuild the balance of station facilities due to their age. The strain bus, various switches, wireways, relay panels, etc. will be replaced. A new control house also will be installed.

- Amberg-Dave's Falls 69 kV Line: Reroute the existing 69 kV line to the Dave's Fall Substation to the 138/69 kV transformer at Amberg Substation. The line presently crosses ATC's land where the Amberg Substation is located.

- White Rapids Substation: Construct the new White Rapids Substation, and install a 4-position ring bus to provide additional reliability and operational flexibility. Terminate lines from the Chalk Hills hydro-generator, Amberg Switching Station, Ingalls Substation (a new WPS distribution substation to replace the Grand Rapids Substation), and White Rapids hydro-generator at the new White Rapids switching station. A site plan conceptual layout is located in Appendix B, Figure 11.

  The ring bus configuration will provide multiple benefits:

  - It will permit interruption of any one segment/line without interrupting power flows among the remaining lines. Additions to the existing straight bus would interrupt all power flows for an outage of the 138 kV bus.
  - Presently any outage on the Amberg-White Rapids line (60851) affects the three terminals at White Rapids hydro, Chalk Hills hydro, and Amberg switching station. This 3-terminal line is to be rebuilt as two separate lines (White Rapids to Amberg and White Rapids to Chalk Hills). Reconfiguration with separate terminals at the new ring bus will increase reliability because any outage of one line segment will not affect the others.
  - White Rapids hydro does not contain a terminal breaker for line 60851. The connection to the new 138 kV ring bus will provide a radial feed to the hydro eliminating the need for addition of a line terminal breaker at White Rapids.

- ATC's long-term plans foresee an extension of 138 kV facilities north from the Chalk Hills hydro substation to Chandler Substation or Nordic Substation. This extension would provide a fourth path for transmission service through the Marinette/Menominee area. The new ring bus at White Rapids will provide operating flexibility to facilitate this future connection.

Because of space limitations at the present location for the White Rapids Substation, ATC is seeking a new site adjacent to the existing line right-of-way on either the Michigan or Wisconsin side of the Menominee River. Properties suitable for a new substation site have been identified, and ATC is contacting the landowners of these potential new sites to determine if a voluntary purchase can be negotiated.

The reason for relocating White Rapids Substation is due to the confined space limitation (footprint of existing fenced-in area) of the existing substation. The cost to reconstruct the substation in place would also add an estimated $500,000 to the project cost due to redispatch costs that would be incurred to take the We Energies' White Rapids hydro generation plant offline for a period of three months during construction.

If the substation reconstruction were to be accomplished through expansion of the existing facilities or construction near the present substation, another constraint would come into play. The land surrounding the substation is part of the Federal Energy Regulatory Commission (FERC)-licensed hydro-electric facility. To expand the existing substation beyond in its present boundaries would require approval from FERC as well as conducting an archaeological survey, which might reveal conditions that would not permit substation expansion or relocation at the present location. The time required to conduct the archaeological survey and obtain the needed FERC authorization could require many months, would delay the project schedule, and could likely result in a rejection of the site for station expansion or relocation.

- Grand Rapids/Ingalls Substation: Upgrade the two existing 69 kV terminals to 138 kV line terminals. Wisconsin Public Service Corporation plans to construct a new, jointly-owned substation at the existing Grand Rapids Substation site. The new substation would be named Ingalls Substation, and the Grand Rapids Substation would be retired.

ATC plans to first energize the reconductored 138 kV line from Amberg Switching Station to White Rapids Substation. Then the rebuilt line from White Rapids Substation to Ingalls Substation will be energized at 138 kV. When Ingalls Substation is energized, WPS transmission service requirements for its distribution load will be transferred from Grand Rapids Substation to Ingalls Substation. Next, the remaining Grand Rapids 69 kV line from the WPS Bay de Noc Substation will be de-energized, and the Bay De Noc load will be bridged to other sources. Finally, the 69 kV line facilities west of Ingalls will be removed.

- Amberg-White Rapids Line: Remove the existing 69 kV circuit (T-150) from White Rapids to Dave's Falls distribution substation because the 69 kV facilities at White Rapids Substation will be converted to 138 kV operation. (This 69 kV circuit shares the lattice towers with the 138 kV Amberg-White Rapids circuit, with the 69 kV circuit on the south side of the towers and the 138 kV circuit on the north. The close proximity of Dave's Falls Substation will permit it to be served from Amberg Switching Station.)

  Reconductor the existing 8.7-mile 138 kV transmission line (4/0 AWG ACSR conductor) with T-2 477 kcmil ACSR conductor plus OPGW shield wire. Reuse the existing double-circuit tangent steel lattice towers and replace angle lattice steel structures with weathering steel poles on the existing right-of-way. Locate the lowest phase conductor to a higher position on the vacant side of the structures to provide needed ground clearance for the heavier conductor.

Phase 1, Stage 2. The following construction steps will be performed together in the first construction phase with many steps being performed simultaneously:

- Plains-Amberg Line: Remove the existing 22-mile, double-circuit transmission line consisting of 4/0 AWG ACSR conductor, shield wire, and 1925-vintage lattice steel towers. Construct a new 22-mile, 138 kV double-circuit transmission line with T-2 477 kcmil ACSR conductor and OPGW shield wire on the existing right-of-way centerline using double-circuit weathering steel poles.

- Grand Rapids-White Rapids Line: Rebuild the existing 13-mile, 69 kV transmission line (4/0 AWG ACSR conductor) for operation at 138 kV with T-2 477 kcmil ACSR conductor. Replace the existing wood H-frame and wishbone structures with single-circuit weathering steel poles on the existing right-of-way centerline.

- West Marinette Substation: Install a new 138 kV terminal.

- Bay De Noc-Grand Rapids Line: Rebuild/reconductor the existing 14.2-mile 69 kV combination of #1 AWG solid copper and 1/0 AWG 7-strand copper single-circuit transmission line with T-2 477 kcmil ACSR 138 kV conductor plus OPGW shield wire on a combination of steel, round wood and wood laminated poles (to accommodate distribution underbuild) on existing right-of-way. Remove the existing 69 kV conductor, shield wire and triangular structures.

- Menominee-Bay De Noc Line: Install new 138 kV T-2 477 kcmil ACSR conductor and OPGW shield wire on new single-circuit weathering steel poles on the existing right-of-way centerline. Remove the existing 1.6 miles of 69 kV conductor and horizontal line post pole structures.

- Bay De Noc Substation: Remove and retire the 69 kV facilities at the substation.

- West Marinette-Menominee Line: Install new double-circuit weathering steel poles structures on the existing right-of-way centerline. Transfer the existing 69 kV 477 kcmil ACSR conductor and shield wire to the new structures. Install 7.1 miles of new double-circuit transmission line (3.8 miles in Wisconsin and 3.3 miles in Michigan) using T-2 477 kcmil ACSR 138 kV conductor plus OPGW shield wire for the 138 kV circuit. Remove the existing 1967-vintage wishbone-style wood poles.

Phase 1, Stage 3 (Plains-Amberg Temporary Bypass Line: Remove the temporary bypass line. This construction step is not critical to meeting the completion target of June 2005. Removal could take place as soon as the east circuit of the Plains-Amberg line is placed in service.

Phase 2 Construction

The following construction activities are planned for completion by June 2006:

- Amberg-Crivitz Line: Rebuild the existing 22-mile, 138 kV double-circuit transmission line with T-2 477 kcmil ACSR conductor with OPGW shield wire on new, double-circuit weathering steel poles. Remove the 4/0 AWG ACSR conductor, shield wire and lattice steel towers.

- Crivitz-Stiles Line: Rebuild the existing 21-mile, 138 kV double-circuit transmission line with T-2 477 kcmil ACSR conductor with OPGW shield wire on new, double-circuit weathering steel poles. Remove the 4/0 AWG ACSR conductor, shield wire and lattice steel towers.

5.03 Transmission System Studies

The transmission line described in this Application is proposed for rebuilding to address reliability concerns and to improve transfer capability within the northern portion of ATC's transmission system. Transmission studies were conducted to assess present and future circuit loading, transfer capability limits, and reliability performance as summarized below.

a. System Normal

Power Flow Analysis Assumptions and Methodology

The most constrained operation for this portion of the transmission system occurs during non-peak load periods when peaking generation is typically not operating. During these times, power flows on the system are generally at their highest levels. For this reason, the analysis for this Project focused on shoulder peak periods (that is, periods when loads are roughly 75% to 80% of peak load, but no peaking generation is in operation).

For the power flow analysis, a 2006 shoulder peak model was developed. The 2006 model assumes the following projects in-service:

- Morgan-Falls-Pioneer-Stiles 138 kV line rebuild[1]

- Morgan-White Clay 138 kV line reconductor[1]

Based on the 2006 shoulder peak model, under system *intact* conditions the Stiles-Amberg and Stiles-Crivitz 138 kV circuits are loaded at approximately 47% and 53%, respectively, of their summer ratings. However, neither intact system performance or circuit ratings are the focus of this Project. System performance under single contingency events—particularly loss of the Plains-Morgan 345 kV line—is the concern.

[1] These line reconductor/rebuild projects will be the subject of separate construction applications as required.

b. Single Contingencies

The two Plains-Stiles circuits are routinely operated near the thermal limit that would result under the most severe contingency (loss of the Plains-Morgan 345 kV line). Under this contingency, the Stiles-Amberg and Stiles-Crivitz 138 kV segments of the Plains-Stiles line are loaded at approximately 110% and 108%, respectively, of their summer emergency rating (112 MVA per circuit). During winter months, when the thermal capability of conductors is greater, power transfer in this segment of ATC's transmission system is limited by either the thermal capability of the circuits or voltage stability at Plains Substation. Presently, the voltage stability transfer limit is approximately 290 MW. These limits restrict ATC's ability to grant transmission service.

The chronic nature of the power transfer limitation imposed by the Plains-Stiles line is demonstrated by the number of transmission loading relief (TLR) incidents called in recent years: 95 events in 2001, 155 events in 2002, and 153 in 2003. Since 2002, the Plains-Stiles line has been the most chronic limitation on the ATC system.

Further, based on recent data, the loading pattern for service to the northern portion of ATC's transmission system is worsening. In 2003, power flows on this portion of the system were within 20% of thermal limits 35% of the time and within 10% of thermal limits 11% of the time. For the first four months of 2004, power flows were within 20% of thermal limits 38% of the time and within 10% of thermal limits 21% of the time.

The Project will increase the combined circuit rating from 224 MVA to 695 MVA under normal conditions and 962 MVA under emergency conditions. (See Appendix A, Figure 2.)

In addition to the work proposed and outlined above, ATC also proposes to upgrade associated terminal facilities at the existing substations and taps along the line. With new and larger conductors, the Stiles-Amberg and Stiles-Crivitz circuits are expected to load to approximately 15% and 18%, respectively, of their normal ratings under system intact conditions. More importantly, these circuits are expected to load to approximately 28% and 29% of their emergency ratings under contingency conditions compared to the present contingency emergency ratings of 110% and 108%. Further, the voltage stability limit for power transfers is anticipated to increase from about 290 MW to about 460 MW. As a result, the probability of blackouts in the northern region of ATC's transmission system for loss of the Plains-Morgan 345 kV line will be significantly reduced.

With the increase in line capacity and the voltage stability limit, ATC's ability to grant and maintain transmission service will be greatly improved. Given the use made of this transmission service path by ATC's transmission customers, ATC anticipates that these facilities will be more fully utilized than indicated in the study results.

c. Alternative Solutions

In its approach to this Project, ATC established minimum requirements that the project needed to address:

- Remove the constraining limitation to transmission service for the Wisconsin-UP corridor,
- Significantly increase the voltage stability limit to transmission service between Wisconsin and the UP,
- Address deteriorated conductor and hardware conditions on the Plains-Stiles line,
- Maintain the current transmission service capability during construction, and,
- Complete the project with a minimum number of outages and minimum delay.

As part of its transmission studies, ATC evaluated a variety of options including a complete rebuild of the line with higher-capacity conductor and modifying the existing structures to support the new conductor. Key considerations in assessing these options were the size and characteristics needed for the new conductor. Not only did the new conductors need to be able to increase thermal capability, but they were also evaluated for their effect on voltage stability. Based on preliminary analyses, conductor sizes of 477 kcmil ACSR and above were adequate for thermal needs, and conductor sizes of 795 kcmil ACSR and above were adequate for voltage stability needs. As a result, ATC focused its evaluation of alternatives with conductor sizes of at least 795 kcmil ACSR.

Six different system alternatives were evaluated, as discussed below:

Alternative 1. Rebuild both circuits of the Plains-Stiles 138 kV double-circuit line with 1033 kcmil ACSR[2] conductor on new double-circuit steel poles. Uprate the terminal equipment at Stiles, Amberg, Crivitz, and Plains substations to 2000-amp thermal capability. (Utilize a 65-mile temporary bypass transmission line during construction to maintain corridor capacity requirements.) This alternative was the starting point of alternative evaluation: Completely replace the existing Plains-Stiles facilities with new, higher-capacity facilities and install a temporary bypass line along the entire route to maintain continuity of the transmission path while permitting de-energized construction.

System Performance. Alternative 1 is a viable solution from a system performance perspective. This alternative removes the capacity limitation, increases the voltage stability limit, addresses line condition issues and maintains corridor capacity during construction.

Constructability. There are numerous obstructions (such as sheds and other outbuilding encroachments that were not prohibited by the original easements) between Amberg and Stiles substations whose presence would make it quite difficult to install temporary line facilities during construction. This situation is compounded by the inability to construct a temporary bypass line within the existing right-of-way through the Village of Crivitz. Without use of a temporary bypass line, energized construction methods would be necessary. Based on investigation of the condition of the existing line hardware, particularly the shield wire and

[2] Note: Although 1033 and 795 kcmil ACSR were evaluated in the studies, T-2 477 kcmil ACSR (with its twisted configuration that offers significantly higher protection against galloping and can be installed to higher tension levels) is now the conductor specified to meet ATC's' design standards.

the uncertainty of a failure, the safety risks associated with energized construction were deemed too significant to pursue this method of construction. In addition, this alternative would not address condition issues on the Amberg-West Marinette line.

Because of the significant concerns for rebuilding the Amberg-Stiles portion of the line, Alternative 1 was not considered further.

Alternative 2. Reconductor both circuits of the 138 kV double-circuit line from Plains to Stiles substations with 795 kcmil ACSR[2] conductor on the existing lattice towers. In cases where a stronger structure would be needed, use new double-circuit steel poles. Uprate the terminal equipment at Stiles, Amberg, Crivitz, and Plains Substations to 1200-amp thermal capability. (Utilize 65-mile temporary facilities during construction to maintain corridor capacity requirements.) This alternative evaluates installation of higher-capacity conductors while reusing as many of the existing structures as possible.

System Performance. Alternative 2 is marginally adequate from a system performance perspective. While this alternative could be expected to minimize delay to a greater extent than other alternatives, it does not provide the same corridor capacity or voltage stability improvement as the preferred alternative, and it does not totally address line condition issues.

Constructability. Based on field investigation, there was uncertainty regarding the structural integrity of the line structures to adequately support larger conductor as well as concern over the condition of the foundations. Because of these concerns, replacing conductor and hardware without replacing structures was deemed to be too risky and uncertain. Further, as in Alternative 1, the condition of the shield wire and the uncertainty of a failure created an unacceptable safety risk associated with energized construction.

From both structural integrity and constructability perspectives, Alternative 2 was not considered feasible. Thus, this alternative was not considered further.

[2] Note: Although 1033 and 795 kcmil ACSR were evaluated in the studies, T-2 477 kcmil ACSR (with its twisted configuration that offers significantly higher protection against galloping and can be installed to higher tension levels) is now the conductor specified to meet ATC's' design standards.

Alternative 3. ***(Preferred)*** Rebuild both circuits of the 138 kV double circuit line from Plains Substation to Amberg Switching Station with 1033 kcmil ACSR[2] conductor on double-circuit steel poles. (Use a 22-mile temporary transmission bypass line during construction to maintain corridor capacity requirements).

Rebuild, reconductor, and convert 69 kV facilities to 138 kV operation as necessary from Amberg to West Marinette substations with 795 kcmil ACSR[2]. Expand the substation at White Rapids to provide three 138 kV line terminals and at Grand Rapids to provide two 138 kV line terminals. Add one 138 kV line terminal at West Marinette Substation. Rebuild both circuits of the 138 kV double-circuit line from Amberg-Stiles with 795 kcmil ACSR[2] conductor on double-circuit steel poles. Uprate the terminal equipment at Stiles, Amberg, Crivitz, and Plains substations to 2000-amp thermal capability.

This alternative evaluates replacement of the existing Plains-Stiles facilities by taking advantage of an opportunity to advance the schedule for reconductor/rebuild other line facilities that will not only address the need for their rebuild and but also eliminate the need to construct 45 miles of temporary bypass line from Amberg to Stiles substations.

System Performance. Alternative 3 is the most viable solution from a system performance perspective. This alternative adequately removes the constraining limitation, increases the voltage stability limit, addresses all line condition issues, maintains corridor capacity and does all this while adequately minimizing outages and delay. Although the initial capital costs are greater than Alternative 3a, the incremental benefits gained (100 MW of voltage stability and 40 MW of emergency transfer capability) plus addressing current hardware condition issues justify additional initial expenditure. The rebuild, reconductor, and conversion of the 69 kV facilities to 138 kV operation from Amberg to West Marinette effectively bypasses the southern 45 miles (2/3) of the Plains-Stiles double-circuit line allowing de-energized construction methods to be used on that segment. In addition to the primary objectives, this alternative addresses 138 kV and 69 kV condition and reliability issues between the Menominee Substation and Amberg Switching Station.

[2] Note: Although 1033 and 795 kcmil ACSR were evaluated in the studies, T-2 477 kcmil ACSR (with its twisted configuration that offers significantly higher protection against galloping and can be installed to higher tension levels) is now the conductor specified to meet ATC's' design standards.

Alternative 3a. Employ the same scope of work as proposed in Alternative 3 except use 1033 kcmil ASCR[2] conductor and defer the rebuild of the 138 kV double-circuit line from Amberg-Stiles (including the uprate of terminal equipment at Crivitz Substation) until all six of the transmission service improvement projects listed below are in service.

1. Morgan-Stiles 138 kV line rebuild and re-conductor. (2005)
2. Hiawatha-Indian Lake rebuild of existing 69 kV line to double-circuit 138 kV; string one 138 kV circuit and operate initially at 69 kV. (2005)
3. Morgan-White Clay 138 kV line reconductor. (2006)
4. Hiawatha-Indian Lake conversion to 138 kV operation. (2009)
5. Construct a new 345 kV line from Morgan to a proposed 345 kV substation (near New London , Wis., called Werner West). (2009)
6. Cranberry-Conover-Plains project. (2007)

This alternative is a variation of Alternative 3 that defers the Amberg-Stiles rebuild. It was considered since completing the rebuild of the Amberg-Stiles would potentially not be as critical once the rebuild of the Amberg-West Marinette path is complete.

System Performance. Alternative 3a is a viable solution from a system performance perspective.

Constructability. The rebuild, reconductor, and conversion of the 69 kV facilities to 138 kV operation from Amberg Switching Station to West Marinette Substation effectively bypasses the southern 45 miles of the Plains-Stiles double-circuit line, avoiding the need for energized construction on that segment. However, by deferring the rebuild of the Amberg-Stiles section of the line, nearly half of the projected increase in the voltage stability limit (46%) and emergency transfer capability increase (47%) is not realized. In addition, the condition issues on the Amberg-Stiles line segment would not be addressed for several years.

Because of the delay in realizing increased voltage stability and emergency transfer capability, combined with deferral of addressing facilities and equipment condition issues, ATC does not feel this is the most prudent alternative.

[2] Note: Although 1033 and 795 kcmil ACSR were evaluated in the studies, T-2 477 kcmil ACSR (with its twisted configuration that offers significantly higher protection against galloping and can be installed to higher tension levels) is now the conductor specified to meet ATC's' design standards.

Alternative 4. Rebuild, reconductor 795 kcmil ACSR[2] conductor, and convert 69 kV facilities to 138 kV operation, as necessary from Amberg to West Marinette substations with. Rebuild, reconductor with 795 kcmil ACSR[2] conductor, and convert 69 kV facilities to 138 kV operation as necessary from White Rapids to Chandler substations. The focus of this alternative is to increase transmission service capability by constructing a new path to a new location in the northern portion of ATC's transmission system.

System Performance. Alternative 4 is a marginally viable solution from a system performance perspective. However, this alternative did not resolve the voltage stability and emergency transfer capability issues nearly as well as the preferred alternative.

Constructability. This alternative did not address the Plains-Stiles physical condition issues and would require more time to construct due to acquisition of 23 miles of new rights-of-way to route the line through the Delta substation and the associated public outreach lead-time.

Due to its marginal system performance, unresolved voltage stability and emergency transfer capability issues, lack of addressing Plains-Stiles equipment condition issues, and new right-of-way requirement, Alternative 4 was not considered further.

Alternative 5. Rebuild the existing Morgan to Plains 345 kV H-frame, single-circuit pole line with a double-circuit 345 kV steel pole line and add a new 345 kV circuit initially operated at 138 kV. Connect the new circuit (to be operated at 138 kV) to Stiles Substation via the proposed future second circuit between Morgan and Stiles substations. The new line would terminate at Plains and Stiles substations via Morgan Substation. Add 138 kV terminals at Stiles and Plains substations. Similar to Alternative 4, this alternative also creates a new path for transmission service but to the same location, Plains Substation, as found in alternatives 1 through 3a.

System Performance. Alternative 5 is a viable solution from a system performance perspective, although it does not provide quite the increase in voltage stability as the preferred alternative.

[2] Note: Although 1033 and 795 kcmil ACSR were evaluated in the studies, T-2 477 kcmil ACSR (with its twisted configuration that offers significantly higher protection against galloping and can be installed to higher tension levels) is now the conductor specified to meet ATC's' design standards.

Constructability. This alternative does not address the line condition issues for several years.

Because this alternative would effectively place the two highest capacity circuits on the same right-of-way (concern for route diversity) and does not address the condition issues on the Plains-Stiles substations or Amberg-West Marinette lines, it was dropped from further consideration.

Economic Analysis

Because the alternatives above differ in scope, an economic comparison that evaluates all alternatives on an equal basis was necessary. For instance, certain alternatives address condition issues on the Plains-Stiles, Amberg-West Marinette or Amberg-Chandler lines; others do not. Certain alternatives address the need to convert the Amberg-West Marinette and Amberg-Chandler 69 kV lines to 138 kV operation in the future; others do not. Thus, for those alternatives that do not address the condition issues and/or voltage conversion needs on those lines, the cost to rebuild/convert those lines were included since this work will need to be done in the future to ensure reliable operation of those lines and the system.

The economic comparison of alternatives considered the estimated capital costs, the projected loss cost savings, generation redispatch, and the capital costs associated with addressing line condition and voltage conversion that would be required on facilities not addressed in each particular alternative. The economic analysis summary is located in Appendix A, Table 1.

As indicated in Table 1, the alternative with the lowest overall cost is Alternative 4, followed closely by Alternative 2. However, as discussed in the System Performance sections of each alternative, the performance of Alternative 4 is marginal, and this alternative does not address the most imminent line condition issue (Plains-Stiles). Alternative 2, as discussed above, would require energized construction, which was deemed to be infeasible.

The preferred alternative, Alternative 3, has the next lowest overall cost. Alternative 3a, in which the rebuild of Amberg-Stiles is deferred, is slightly higher than Alternative 3, largely due to the loss savings not realized by deferring Amberg-Stiles. Alternative 1, as discussed above, would require energized construction and deemed to be infeasible. Alternative 5 costs are over 50% greater than Alternative 3.

Based on the technical and economic comparison, Alternative 3 is the preferred alternative. From a technical perspective, it is the strongest-performing alternative. From an economic perspective, it was second among feasible alternatives.

d. Electrical Losses

A transmission system loss analysis was conducted to compare the alternatives described above. The loss cost summary is provided in Appendix A, Table 1. The loss comparison is shown in Appendix A, Table 2.

Although ATC does not own generation, nor incur the costs associated with transmission losses, ATC performed a loss analysis for the purpose of comparing the proposed alternatives from a transmission line loss perspective. All amounts set forth in the analysis are estimates and do not reflect actual transmission loss costs. The loss analysis was conducted for each alternative for years 2005-2013, for both peak load and shoulder peak conditions. The difference (reduction) in losses from the base case (assuming no reinforcement project) was computed across the ATC system. Loss differentials at peak load were multiplied by a proxy cost for new generation ($500/kW in 2004, escalated at 2.5% annually) to reflect the value of capacity losses. Energy losses were calculated assuming peak load conditions represent 10% of hours in each year and shoulder peak conditions represent the remaining 90% of hours. Energy loss differentials were multiplied by applicable energy futures prices and escalated at 2.5% to reflect the value of energy losses. All loss costs were discounted at 10% to 2005 dollars. Thus, loss reductions in early years are valued higher than in later years.

The loss cost results in Table 2 indicate that Alternative 1 has the lowest projected loss costs, followed by Alternatives 3 and 2, respectively. The remaining alternatives had much lower loss savings due to the deferral of the Amberg-Plains line segment rebuild.

e. Dynamic Stability Analysis

This application does not include new generation. Therefore, stability studies were not performed. This Project is expected to have a positive, though minimal, impact on the stability of Presque Isle Power Plant generating units.

5.04 Substation Facilities

Substation facilities requiring upgrade as part of the proposed work are listed below:

Wisconsin Substations

Amberg (W7775 CTH K, Town of Amberg). Uprate the terminal equipment for 138 kV lines (60853, 60842, 60841, 64443), and the bus tie breaker to 2000 amp thermal capability. Install breakers with a 2000 amp capability. Expand the station by 120 feet to the south (on ATC property). In the expanded station, install a 138 kV bus, a 138/69 kV transformer to serve the nearby Dave's Falls distribution substation, and a deadend structure for the Amberg-White Rapids line.

Crivitz (F# N6000 Hwy. 41, Town of Wausaukee). Uprate the terminal equipment for 138 kV lines 60841 and 64452 to 2000-amp thermal capability.

Stiles (4888 Cook Rd., Town of Oconto). Uprate the terminal equipment for 138 kV 64452, 64443, and the bus tie breaker to 2000-amp thermal capability.

West Marinette (W1830 Cleveland Ave., Town of Peshtigo). Add a 138 kV breaker capable of a minimum continuous summer normal rating of 2000 amps (478 MVA) to the 138 kV bus and terminate the new 138 kV line.

Michigan Substations

Plains (F#W6879 Town of Breitung). Add a 138 kV breaker to the 138 kV ring bus and terminate line 60853 on the ring at the location shown in Appendix A, Figure 2. The existing line 60853 position would be used to terminate a proposed 138 kV line to Conover Substation as part of the Cranberry-Conover-Plains project. Uprate the terminal equipment for line 60842 to 2000-amp thermal capability.

Bay De Noc (U.S. 41 3 miles N. of STH 35, Town of Menominee). Remove and retire the 138 kV facilities at the substation.

Grand Rapids (N6651 P-2 Town Rd., Town of Lake). Construct a 138 kV substation with two line positions (including breakers), two bus sections, a bus tie switch and one position per bus section for interconnection to the WPS Ingalls distribution substation.

White Rapids (N10125 River Rd., Town of Holmes). Construct a 4-position, 138 kV ring bus at a new switching station location. Install three 138 kV breakers capable of a minimum continuous system normal rating of 2000 amps to terminate the 138 kV lines to Chalk Hills, Amberg, and Grand Rapids/Ingalls substations.

Rosebush (N10125 River Rd., Town of Holmes). Remove and retire the substation facilities that previously served Dave's Falls Substation at 69 kV.

5.05 Contractual Agreements

The Commission's application requirements request information about contractual agreements between the developer and utilities to construct, finance, lease, use or own transmission facilities. Since no developer is involved with the project.

5.06 Wheeling Agreements

The Commission's application requirements request information about wheeling agreements between the developer and utilities. Since no developer is involved with the project, there is no information to provide.

5.07 Cost

ATC estimates the total gross cost of the Project to be $68,752,900 as summarized below. The cost of the project will be met from internal sources and/or the issuance and sale of securities.

a. Project Cost Estimate

Capital Cost	**Wisconsin**	**Michigan**
Transmission Lines		
Plains-Stiles	$30,307,400	$1,472,600
Amberg-W. Marinette	5,046,000	11,916,800
Sub-total Transmission	**$35,353,400**	**$13,389,400**
Substation Construction		
Stiles, Crivitz, Amberg, Plains and W. Marinette Substations	$3,914,700	
W. Marinette, Bay De Noc, Grand Rapids Hydro, White Rapids Hydro Substations		$7,048,900
Sub-total Substation	**$3,914,700**	**$7,048,900**
Pre-Certification Costs	**$406,200**	
Total, Capital Cost	**$39,674,300**	**$20,438,300**
Removal		
Removal of existing single-circuit structures		$8,369,000
Expense		$271,300
Gross Project Cost		**$68,752,900**

The proposed facilities to be retired and their gross book value are listed below by plant account:

Plant Account	Description		Gross Book Value WI Assets	Gross Book Value MI Assets
353	Station Equipment		$281,700	$272,600
355	Poles and Fixtures		$167,400	$300
356	Overhead Conductors and Devices		$73,500	$21,500
		Total	**$522,600**	**$294,400**

b. Future Facilities

Construction concerns regarding the village of Crivitz may alter the construction plan. (See Section 5.08.b, Construction Practices.)

c. Electrical Losses

Electrical losses are discussed in Section 5.03.d above.

Redispatch Analysis

Without the upgrade of the Plains-Amberg-Crivitz-Stiles 138 kV line, ordered generation redispatch costs can be expected to rise. Redispatch costs associated constraints on this portion of ATC's system for 2003 were nearly $5 million, with approximately $2 million directly due to the Plains-Amberg-Crivitz-Stiles 138 kV line. Other proposed reinforcements in the northern portion of the transmission system, if completed before this Project, would aggravate the line loading problems that exist between Wisconsin and the Upper Peninsula and require additional redispatch.

Redispatch during construction was evaluated for each alternative as discussed in the Economic Analysis provided in Section 5.03.c above. Redispatch costs associated with each alternative are provided in Appendix A, Table 1. Those alternatives employing energized construction, Alternatives 1 and 2, were estimated to incur $627,000 in redispatch during construction due to the number to outages required to tie the temporary line circuit in order to take existing line segments out of service.

Stability Analysis

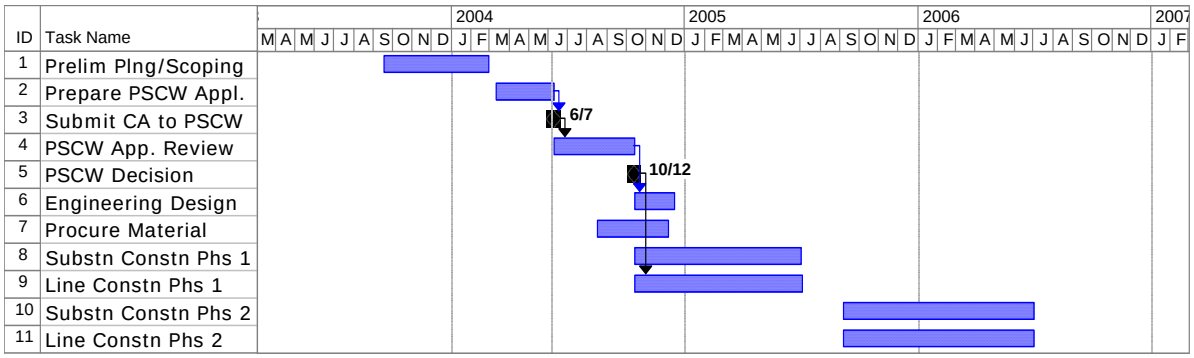
The Plains-Stiles 138kV lines uprate would lower the effective impedance on this segment of ATC's transmission system. In doing so, voltage stability at Plains Substation, which is a limitation to transfer capability under certain circumstances, will improve by approximately 150 MW. The Project would have minimal benefits in terms of improving angular stability at Presque Isle (See Section 5.03.e).

5.08 Construction Schedule and Practices

a. Schedule

Due to the scope of this Project and criticality of outage timelines, ATC proposes constructing the necessary facilities in a phased approach. Refer to Section 5.22.a of this document for a detailed description of the line segments involved in each phase.

Schedule detail:



Phase 1 (2004-2005)

ATC proposes first to construct a temporary line parallel to the existing 79-year-old, 22-mile segment of double-circuit 138 kV transmission line between Plains Substation and Amberg Switching Station (Segment 1, as shown on Appendix B, Figure 0). Then, once the temporary line is placed in service, ATC would de-energize and then rebuild the existing 22-mile segment of 138 kV transmission line between Plains Substation and Amberg Switching Station.

ATC would also reconductor the existing 8.7-mile single-circuit 138 kV transmission line between Amberg and White Rapids substations with T-2 477 kcmil ACSR conductor. In addition, ATC would rebuild the 34-mile, single-circuit 69 kV transmission line (Segments 4 to 7, as shown on Appendix B, Figure 0) to double-circuit (69/138 kV) configuration between White Rapids and West Marinette substations. This circuit will essentially form an easterly bypass, which will permit de-energized construction of Phase 2. Approximately two-thirds of 45-mile transmission line between Amberg and West Marinette substations is located in the state of Michigan.

Phase 2 (2005-2006)

Following Phase 1, ATC would rebuild the existing 45-mile, double-circuit 138 kV transmission line between Amberg and Stiles substations (Segments 2 and 3) with T-2 477 ACSR conductor on double-circuit weathering steel poles.

Outage Coordination

Because of the critical nature of the affected lines, ATC believes that it is necessary to commence the initial work as soon as possible in 2004, ideally during the first week of August 2004. Because the first phase would involve de-energizing the Amberg Switching Station, outages on the following 138 kV lines will be required: Plains-Amberg (line 60853), Stiles-Amberg (64443), Crivitz-Amberg (60841) and Amberg-Plains (60842). ATC estimates that two weeks would be required to complete the work associated with these outages. With each outage, the Wisconsin-Michigan transfer capability limit would be reduced by 112 MVA. This must be balanced by providing 112 MVA of additional generation in the Upper Peninsula through redispatch. Generation resources in the UP are limited, and generation redispatch can be very expensive. The largest and most economical generation in the UP is the Presque Isle Power Plant. Presque Isle has all of its units scheduled as available between June and August 29, 2004. After August 29, Presque Isle will have at least one unit out of service most of the time until the summer of 2005.

b. Construction Practices

In general, the rebuilding of an overhead transmission line requires some right-of-way clearing, removal of existing conductors and structures, installation of replacement structures, stringing of conductor, and restoration. A proposed construction and access plan can be found in ATC's Application for Permits submitted to the DNR contemporaneously with this application and appended to this application as Appendix D, Exhibit 1.

For transmission line reconstruction activities, the easement width is cleared of trees and brush. This allows access for construction and maintenance equipment and eliminates future conductor-to-vegetation contacts and resultant line outages. Normally, vegetation is removed to a height of less than 4 inches, but no grubbing occurs. Any brush or trees cleared are disposed in accordance with the property owner's direction. Cuttings may be chipped and spread on the right-of-way, if permitted by the property owner.

Construction Concerns. There are four locations (see below) where line construction is expected to be challenging. (See the map in Appendix B, Figure 0.)

- through the city of Niagara, Wisconsin (segment 1);
- between Amberg-White Rapids substations on the Wisconsin portion (segment 4);
- through the Village of Crivitz (segment 2); and
- north of Stiles Substation (segment 3).

ATC proposes to address these construction concerns as described below. ATC discussed these concerns with Commission staff at a meeting on April 4, 2004.

City of Niagara

The existing double-circuit 138 kV line passes through the city of Niagara along the centerline of the 70-foot-wide Goodreau Street (See Appendix E, Exhibit 3 plan drawing) within an existing 106-foot right-of-way (easements dated 1925). There are residences on both sides of Goodreau Street, and the residential properties extend into the transmission line right-of-way.

There is limited space within the existing right-of-way width to construct the temporary bypass line while maintaining adequate safety clearance during the rebuild of the existing steel lattice tower line. Two existing line structures are along this constricted portion. The street veers around the southernmost structure, while it skirts both sides of the northernmost structure.

American Transmission Company investigated two alternatives to constructing a temporary bypass line:

- Following an existing 345 kV right-of-way (located in the area). Because this alternative would have involved considerable cost and also required additional time to construct, it was not pursued.

- Utilize D-phase-style construction. This approach maintains continuity of service through temporary installation of a fourth conductor to serve as a proxy for each phase conductor while it is being replaced. After inspection of the existing structures, the D-phase construction alternative was eliminated due to the questionable condition of the existing structure foundations and outage challenges.

The temporary bypass line involves installation of new single-pole wood structures with post insulators that would parallel the existing centerline. The line would be installed at the easterly edge of the 106-foot-wide right-of-way so that the existing tower line can be de-energized for replacement construction. The post insulators will point inward on the ROW to support the three temporary conductors. These conductors will be in close proximity to the following two residences: 2209 Sherman Street and 2209 Goodreau Street. (See drawings in Appendix B, Figures 8 and 9 and photos in Appendix E, Exhibits 4 and 5.) Pole placement will require guying on private property and necessitate some tree trimming (removing visual screening of line) to provide safe clearance. ATC will work with local officials and affected property owners to coordinate installation of the temporary bypass line facilities. All work will be closely supervised by qualified personnel to assure public safety and compliance with Wis. Admin. Code § PSC 114.005(4).

Amberg-White Rapids Line Segment

Based on ATC's inspection, there are three items of potential concern regarding the location of the existing line conductors, the proposed reconductoring, and the applicability of the Wisconsin State Electrical Code, Volume 1 (Wis. Admin. Code § 114). The proposed work scope for this line segment involves only the reconductoring of an existing transmission line that will continue to remain in service, not the construction of a new line (which would involve new structures, conductors and hardware). As such ATC concludes that its proposed reconductoring activity will not be in violation of the provisions of Wis. Admin. Code § 114.

Line Over Dwellings. Between tower structures #473 and #475, two spans of line conductor pass over at least one dwelling, perhaps two, and one garage. Wis. Admin. Code § 114.234A4 does not permit supply lines that operate in excess of 35 kV to be constructed over dwellings.

Residential Fuel Tanks. There are two above-ground liquid propane gas storage tanks (under 1,000 gallon capacity) in close proximity to (not under), the existing lines. (See Appendix E, Exhibits 6 and 7 for sketches of the locations of these tanks.) Wis. Admin. Code § PSC 114.234C7 specifies the clearance required for lines near fuel storage tanks.

Residential Well Pipe. Near structure #456, there is a residential well pipe located under this segment of the proposed reconductoring,. (See surveyors sketch in Appendix E, Exhibit 8.) Wis. Admin. Code § PSC 114.234C8 specifies the clearance of lines near wells.

Village of Crivitz

The existing double-circuit line that ATC is proposing to reconstruct is located immediately adjacent to the east side of U.S. Highway 141. Some of the conductors on the east side of the line pass over three commercial businesses near the intersection of County Trunk Highway (CTH) W and U.S. Highway (USH) 141: Sportsman's Bar and Gateway Bar (see photos in Appendix E, Exhibits 9, 9a and 10) and a law/insurance office. After reconstruction, line conductors would still be located over these businesses. When reconstructed, the line conductors (in their wind-displaced position) may also pass over a small single-family dwelling located south of USH 141 and CTH W. (See photos in Appendix E, Exhibits 11 and 12.)

Transmission Line Impact on Dwellings. Because three of the buildings contain dwellings, the proposed line reconstruction will be subject to the provisions of Wis. Admin. Code § 114.234A4 (Transmission lines over dwelling occupancies). ATC plans to deal with each of these instances as follows:

- Sportsman's Bar. The bar is currently closed for business and is for sale. A portion of the building is presently utilized for dwelling purposes. ATC plans to pursue acquisition of this property and attach a deed restriction prohibiting its use as a dwelling prior to resale.

- Gateway Bar. A portion of the upper level of the Gateway Bar is presently utilized for rental dwelling purposes. ATC plans to seek a deed restriction from the existing property owner prohibiting use of the commercial structure for residential purposes and will compensate the owner for the restriction.

- Law/Insurance Office. ATC will contact the owner of the law/insurance office to ensure the building is used strictly for commercial purposes.

- Small Single-Family Dwelling. The building is presently unoccupied and is for sale. ATC plans to pursue purchase of this property.

Location Concerns. Concern over the presence of the transmission line through the village of Crivitz (and the pending reconstruction of the line) has been expressed by village officials. The need to reconstruct the line offers an opportunity to evaluate options for relocation. ATC will work with the village to examine these options. Should a plan develop for a relocation alternative, ATC will advise the

Commission and will seek appropriate authority for approval if it is decided to proceed with construction.

North of Stiles Substation

One residential structure has been identified as being under or in close proximity to the transmission line located at F#8914 Belgian Rd. in the town of Lena.

Based on a drive-by inspection, the residence appears to be occupied. The edge of the roofline is approximately twelve feet from the centerline of the right-of-way, thus locating it under the center phase conductor of the existing transmission line. Although ATC has not yet conducted final engineering for this segment (Phase 2 construction), several construction alternatives are available to assure that the new line conductors will be located away from the residence in compliance with the Wisconsin State Electrical Code Wis. Admin. Code § PSC 114.005(4) such as:

a. Use a more compact construction design.
b. Shift the centerline to the west within existing right-of-way.
c. Install an additional pole along the affected span to reduce blow-out.

Upon completion of final engineering, ATC will pursue the most suitable option to ensure that none of the line conductors, in their wind-displaced position, will be over the dwelling.

c. Installing a Steel Structure with a Concrete Caisson Foundation:

1. Installing a new caisson foundation involves: drilling or blasting, which may be cased to prevent caving; placing a reinforcing bar cage into the excavation and supporting it; placing an anchor bolt cage into the shaft and supporting it; pouring concrete into the shaft; extracting the casing (if used) during the pour; forming the exposed portion of the foundation (approximately 12 inches above grade); and finishing the surface. The concrete foundation is allowed sufficient time to cure and gain the required strength.

2. Assembling the structure, which is typically delivered in two pieces, is accomplished by jacking the upper tapered section over the lower tapered section. The arms that support the conductors and shield wires are assembled onto the pole prior to erection of the structure. The new structure is typically assembled near its installed location.
3. A crane is used to lift the pole onto the foundation. The pole is secured to the foundation by the anchor bolts.
4. Conductor hardware, including insulator strings, is placed on the new structure, if possible, prior to erection.

   Excess soils and rock from excavations in uplands may be spread in the right-of-way and stabilized (seeded and mulched) or hauled to an offsite disposal location, depending on property owner's requirements. All excess soils in wetland areas will be removed from the wetland and disposed of in an upland area. In any area where conditions may be conducive to erosive losses, (erodable soils, slopes, wetlands or streams adjacent to site) appropriate erosion control measures as described in the DNR "Construction Site Best Management Practices" will be followed and maintained until final restoration and revegetation is complete.

d. Installing Direct-Embedded Structures

The procedure for construction and erection of direct-embedded structures is essentially the same as for structures with foundations except for construction of the structure foundation. The construction and erection sequence differs as follows:

1. A shaft is drilled or blasted to the depth required by the length and type of pole. The excavated material is properly disposed of in an upland area either onsite or offsite as required. If the soil conditions require, temporary split barrels are used to hold the hole open until the pole is in place.
2. The pole is lifted in place with a crane and set in the hole. Crushed stone is used to fill the space in the hole and is compacted.
3. Subsequent to the transmission line structures being set in place, the conductors and shield wire(s) are installed.

e. Installing Conductor and Shield Wire

1. Pulling dollies are installed at each structure (one per conductor and shield wire), and a pulling line is run through the dollies.
2. The pulling line is used to pull the conductors and shield wire into position.
3. The conductor and shield wire are sagged to the proper tension.
4. The conductors are clamped to the insulators, and the shield wire is clamped to the structure at each location. The dollies are then removed from each structure.

Timing the transmission line construction to occur during winter months, particularly in environmentally sensitive areas, minimizes impacts to the environment. Depending on the accessibility and soil conditions at the new structure site, construction mats may be needed to provide support for construction equipment.

Depending on weather and ground conditions (frozen, snow cover, etc.) at the time of construction, the appropriate site access method will be used to minimize temporary construction ground disturbance. If there is a sufficient frost layer and some snow cover, it may be possible to complete the work utilizing standard utility construction equipment to install structures, conductors, and shield wires. If conditions do not allow access using standard utility construction equipment, construction mats or low ground pressure tracked equipment are utilized to reduce impacts.

5.09 Upgrade Responsibility

ATC is responsible for all transmission line construction or re-construction associated with this Project.

5.11 Ownership

ATC will own the facilities that are constructed.

5.12 New Transmission Line Configuration

The new overhead transmission line configuration would be a double-circuit on double-circuit weathering steel poles (replacing steel lattice structures) as shown in Appendix B, Figure 7.

5.13 Applicable Tariffs

American Transmission Company provides transmission service pursuant to its FERC-approved Open Access Transmission Tariff.

5.20 ROUTE INFORMATION

The information presented in this section describes the transmission line routes. Details are provided in Section 5.12 of this document.

5.21 General Route Information

As described in Sections 5.01-5.02, the existing and proposed ATC facilities are located in Oconto and Marinette counties in Wisconsin and in Dickinson and Marinette counties in Michigan. Appendix B includes copies of USGS quadrangle maps, aerial photographs, and figures identifying zoning and land-use marked to show the line routes. Wisconsin Wetland Inventory data and field delineation data for Plains to Stiles have been overlain on the aerial photographs, and Federal Emergency Management Agency Flood Plain information has been added to a street base map. Digital data files, suitable for importing into a GIS program, will be provided for staff use (under separate cover). Field delineation data will be collected for the Amberg to West Marinette segments beginning in spring 2004. All delineation data is located in the Environmental Support Document.

Construction activities related to building transmission facilities on existing rights-of-way will affect only lands that are currently in use as a transmission line corridor or existing electric transmission substations. None of the activities is expected to alter the existing land use or require changes in zoning.

5.22 Detailed Route Information

This section provides specific information to characterize the transmission line routes.

a. Route Segment Information

Appendix B, Table 2, provides the following information for the existing transmission line rights-of-way: total length (miles), existing right-of-way (acres), and percent corridor sharing. Appendix B, Table 2, also provides forestry, wetlands, floodplains, and agriculture information.

Segment 1 (Plains-Amberg): The double-circuit 138 kV transmission lines (designated 60842 and 60853 by ATC) run in a southerly direction 19.1 miles between the existing Plains Substation and Amberg Switching Station. Plains Substation is located in the town of Breitung, Dickinson County, Michigan. The transmission lines then run through the city and town of Niagara in Marinette County, Wisconsin continuing through the townships of Pembine and Beecher to the existing Amberg Switching Station in the town of Amberg, Marinette County.

Segment 2 (Amberg-Crivitz): The double-circuit 138 kV transmission lines (designated 60841 and 64453 by ATC), run 22.5 miles in a southerly direction between Amberg Switching Station (through the towns of Wausaukee, Middle Inlet and Stephenson) and Crivitz Substation in the village of Crivitz, Marinette County.

Segment 3 (Crivitz-Stiles): The double-circuit 138 kV transmission lines (designated 64443 and 64452 by ATC), run 21.5 miles in a southerly direction from Crivitz Substation (through the towns of Stephenson, Beaver, Pound, Lena Oconto and Stiles) to Stiles Substation in the town of Stiles, Oconto County.

Segment 4 (Amberg-White Rapids): The first 8.5 miles of single-circuit 138 kV transmission line designated KK60851 by ATC, runs in an easterly direction on steel structures from Amberg Switching Station through the town of Amberg in Marinette County, Wisconsin to the adjacent Rosebush and White Rapids substations in the town of Holmes, Menominee County, Michigan. The 69 kV circuit (designated T-150 by ATC) shares space on the lattice towers supporting line KK60851 between Dave's Falls Substation and the Pike River Switching station.

Segment 5 (White Rapids-Grand Rapids): The direction of the single-circuit 69 kV transmission line (designated T-150 by ATC) changes to a southeasterly angle just east of Rosebush/White Rapids substations, and runs (9.7 miles) through the townships of Holmes, Lake in Menominee County, Michigan. It then continues (3.6 miles) in a southeasterly direction through town of Wagner, Marinette County, Wisconsin to Grand Rapids Hydro Substation.

Segment 6 (Grand Rapids-Menominee River, MI): At a point 1.5 miles east of Grand Rapids Hydro Substation the line (ATC line designation changes from T-150 to O-145) proceeds directly south 14 miles through Mellen and Menominee townships to Bay De Noc Substation. From Bay De Noc Substation the line continues south 2.3 miles to Menominee Substation in the city of Menominee, Menominee County, Michigan. The portion of this segment between Grand Rapids and Bay De Noc substations will contain distribution underbuild owned by WPS.

Segment 7 (Menominee River-W. Marinette): At Menominee Substation, the double-circuit transmission line (designated G-59 by ATC) proceeds in a westerly direction approximately (3.8 miles) through the town of Menominee, Marinette county, Wisconsin, at which point the line begins to run in a southerly direction 4 miles (through the townships of Porterfield and Peshtigo) to West Marinette Substation. Itemized tables containing the following information are located in Appendix B, Tables 2 & 3. This entire segment will contain distribution underbuild owned by WPS.

b. Route Segment – Resource Area

i-iii) Information summarizing the length and area of route segments passing through agricultural land, forest and wetland is shown in Appendix B, Table 2. A description of these lands is contained in Sections 5.22 d.-f.

iv) Recreational Land (parks, wildlife areas, etc.)

The primary impacts to recreational uses are minimal, consisting primarily of short-term impacts during construction (presence of construction equipment, temporary traffic lane closures, and noise). These impacts are not anticipated to be significant. In addition, the work in environmentally sensitive areas will be completed during the winter months to minimize damage from construction equipment. Additionally, work in public hunting areas will be scheduled to occur outside of gun deer hunting season. Disturbed areas will be returned to as close to pre-existing conditions as is reasonably practicable after the rebuild work is completed.

v) Residential Land

The highest concentrations of residential properties located along the transmission line routes are located in and near the city of Niagara and village of Crivitz. Residential development along the balance of the line route consists primarily of scattered rural residences and a few residential subdivisions. Impacts to residential properties resulting from this project would include the short-term transitory impacts of the rebuild work, including the presence of additional construction equipment (traffic and noise). Since the duration of work at any structure location is expected to be short, these impacts are not expected to be significant.

vi) Commercial and Industrial Land

The majority of the proposed work takes place within the existing right-of-way. ATC plans to pursue purchase of the Sportsman's Bar in the village of Crivitz, Wisconsin. A deed restriction on any use as a dwelling would then be placed on the property before placing it up for sale. ATC also plans to pursue a deed restriction regarding any use as a dwelling for the Gateway Bar in Crivitz. No other commercial/industrial buildings or lands will be acquired as a result of this project.

Impacts to commercial/industrial lands will be minimal, consisting primarily of short-term impacts during construction (presence of construction equipment, temporary traffic lane closures, and noise). As the duration of work at any structure location is expected to be short, these impacts are not expected to be significant

vii) Stream or river crossings

Floodplains in the project area are associated with the Oconto, Peshtigo, and Menominee rivers and their tributaries. Appendix B, Table 4, identifies the number of stream crossings along each route segment. The existing transmission line spans the waterways at each of the crossing points. No transmission structures would be located within any stream or stream bank. The Application for Permits in Appendix D contains detailed information on the streams crossed, including anticipated permit requirements and potential crossing methods and techniques.

viii) Information on Endangered or Threatened Species

Information concerning the presence of threatened or endangered species in the areas near the affected line routes and substation sites was obtained through review of the Wisconsin Natural Heritage Inventory database. Information contained in the database identified several plant and animal species within one mile of the affected transmission line routes. The results of this review along with a copy of this application will be submitted to the Wisconsin Department of Natural Resources, Bureau of Endangered Resources, for its review and comment shortly after this application is filed and a docket number assigned. In addition, a confidential copy of specific information identifying the location of endangered, threatened, and special concern species in the project area will be submitted to the Commission separately with a request for confidential treatment due to the sensitive nature of the subject matter in accordance with the guidelines of the Bureau of Endangered Resources.

ix) Historic Sites, including Archaeological Sites

Information regarding the locations of known archaeological resources and historic sites in the project area has been obtained through a review of the records maintained by the Wisconsin Historical Society (WHS). A copy of this information is also being submitted to the WHS, under separate cover, with a request for review.

x) Special Features Impacts

The Amberg-Crivitz segment crosses the parking lot of the Crivitz Medical Center in Crivitz. The medical center buildings are located 75 feet from the line at the closest point.

c. Summary Information

Information summarizing the route is shown in Appendix B, Table 2. Initial environmental and permitting information is located in the Application for Permits Document. All necessary equipment will be utilized according to approved wetlands crossing techniques. Special precautions will be taken where streams, rivers and wetlands are encompassed as part of the route. Some woody vegetation and shrub brush clearing may be required within the existing and proposed rights-of-way to perform the work, but these activities are not different from typical right-of-way maintenance activities. The activities associated with the proposed upgrades are short-term. Any areas disturbed within the existing, and new transmission line rights-of-way would revert to the existing condition quickly.

d. Agricultural Issues by Segment

Agricultural activities are found along the existing transmission line. Primary crops include corn, other row crops and hay (alfalfa, oats, clover, etc.). Fallow fields, old fields, and pastureland were noted along the route. It is unlikely that agricultural impacts would result from this project. Impacts that can occur include land removed from production due to the specific placement of relocated transmission line structures, soil compaction, and impacts to efficient tillage due to line placement. Relocated transmission line structures could create areas that are difficult or impossible to cultivate, or affect drain tiles and surface drains. However, impacts are expected to be minimal with the replacement of the 4-legged lattice towers with steel monopoles.

Work associated with replacing structures also may result in impacts to agricultural lands related to equipment access. If access to a structure location requires travel over cultivated lands, soil compaction could occur. Access to structure locations will be along the existing right-of-way or from public roadways that cross the line route, unless alternate access methods that would result in lower impacts are available and their use is approved by the property owner. ATC will strive to access structure locations using the route or method that will minimize impacts related to this work.

The amount of acreage that could be impacted was calculated by multiplying the width of agricultural land within the right-of-way by the length of the affected property type. The length of property considered in the calculation includes active fields, old fields, and farmyards but does not include land that is currently wooded or portions of wetlands where there is no evidence of current or past tillage.

This information is being submitted to the Wisconsin Department of Agriculture Trade and Consumer Protection for review. It is not expected that an Agricultural Impact Statement will be issued as impacts are expected to be minimal.

Results of inquiries with Oconto and Marinette County Conservationists to determine whether any Farmland Preservation Agreements exist along the existing transmission line route segments. See Appendix D, Exhibit 2, for results.

e. Wetlands by Segment

Appendix B, Table 4, summarizes and inventories the wetlands, wetland crossings, and wetland acreage for each route segment. The acreage of wetlands along the right-of-way was calculated by multiplying the length of the wetlands by the width of the ROW. Field delineation data was collected for segments 1, 2, and 3 in 2003 and is summarized in Appendix B, Table 4 and also in the Application for Permits document. Data will be collected for segments 4, 5, 6, and 7 in 2004.

Potential disruption to wetlands could result during installation of transmission line structures and wires. Wet wooded areas currently are, and would be, maintained free of tall trees along the transmission right-of-way. Wetland shrubs and herbaceous vegetation would be removed at the site of transmission line structure installation and to provide access. Minimal impact to these vegetation types is expected elsewhere. Shrubs and herbaceous vegetation would re-establish in disturbed areas after installation of the structures and lines. Invasive plant species, such as purple loosestrife and reed canary grass could potentially become established in disturbed areas. Specific construction management practices, including those described in Section 5.08 will be employed to minimize this possibility. Further, construction equipment will be cleaned when moving from an area containing invasive species to one that does not to minimize the potential for the spread of these species. Conceptual construction management plans are located in the Application for Permits Document.

f. Forest Land by Segment

The existing transmission line right-of-way has been maintained free of trees or other vegetation that would interfere with safe operation of the transmission line. Low growing woody vegetation would need to be removed only at locations where transmission line structures would be replaced or modified and to provide access for construction equipment. Shrubs and other low growing vegetation would be allowed to re-establish after construction is complete.

As the existing right-of way is maintained free of tall growing trees, information describing the length of woodlands crossed along each route is based on the presence of wooded areas immediately adjacent to the existing corridor. This will tend to overstate the area of woodland that may be affected by the proposed Project. Forestry impacts along the route segments are identified in Appendix B, Table 2.

Impacts to right-of-way adjacent to wooded areas would result from clearing access ways and structure locations at sites where new transmission structures need to be erected. Adjacent access roads may need to be trimmed or cut to allow perpendicular access to the right-of-way, if necessary, to prevent impacts on protected species, their habitats, and wetlands and high quality waterways. No long-term impacts to the wooded areas adjacent to the existing transmission line corridors are anticipated as a result of the proposed Project. A preliminary construction access plan can be found in the Environmental Support Document.

5.30 SUBSTATION INFORMATION

One substation will be modified and another will be constructed in a new location as discussed below.

Amberg Switching Station

As discussed in Section 5.01-5.02.c. of this document, the Amberg Switching Station will be expanded 120 feet south on ATC property to provide space for the 138/69 kV transformer to serve Dave's Falls distribution substation and for a future WPS distribution substation. A 138 kV bus will be installed with a breaker for the Dave's Falls transformer. A deadend structure for the Amberg-White Rapids 138 kV line will also be installed.

The station expansion will be to the east of the existing station on property owned by ATC. (See Appendix B, Figures 9 and 10, for the size of the planned station expansion, the layout of the station expansion, and the location of lines entering and leaving the station.) No additional landscaping is planned at this time. Access roads on ATC's property are not expected to change.

Excess soils and rock from excavations in uplands may be spread on the property and stabilized (seeded and mulched) or hauled to an offsite disposal location. In any area where conditions may be conducive to erosive losses, (erodable soils, slopes, wetlands or streams adjacent to site) appropriate erosion control measures as described in the DNR "Construction Site Best Management Practices" will be followed and maintained until final restoration and revegetation is complete.

ATC also plans to rebuild the balance of station facilities due to their age. The strain bus, various switches, wireways, etc. will be replaced. A new control house will also be installed.

White Rapids Substation

As discussed in Section 5.01-5.02.a. of this document, ATC plans to construct a new the White Rapids Switching Station to replace the existing White Rapids Substation. Because of space limitations at the present substation location, ATC is seeking a new site adjacent to the existing line right-of-way on either the Michigan or Wisconsin side of the Menominee River. Properties suitable for a new substation site have been identified, and ATC is contacting the landowners of these potential new sites to determine if a voluntary purchase or easement for a 3-acre parcel can be negotiated. (See Appendix B, Figure 11, for a site plan and conceptual layout of facilities.)

Because the new station site has not been determined, it is not possible at this time to provide specific information regarding the exact location or size of the parcel for the station, orientation of the station within the parcel, details on landscaping, plat and topographical maps, location and orientation of lines entering or leaving the station, access roads, or general environmental information. As soon as ATC secures a site, this information will be promptly provided.

5.40 EMF INFORMATION

5.41 Transmission Lines

Electric field magnitude is a function of line voltage, and the electric field level will be largely independent of line loading since voltage is closely regulated. Magnetic field magnitude is directly proportional to line current and conductor configuration and can be estimated at any loading level. Calculated (before and after) EMF levels for the proposed transmission line facilities are provided in the EMF Report (Appendix C).

5.42 Existing Substations

None of the substations involved in this project will be affected by new generation or transmission lines. West Marinette Substation will have one new 138kV line coming from Bay De Noc Substation.

5.43 Generation Effects

No new generation will be connected to the ATC system as part of this project.

5.50 OTHER AGENCY CORRESPONDENCE

5.51-5.52 Correspondence

ATC personnel and contractors acting on its behalf have had verbal conversations with the Wisconsin and Michigan Dept. of Transportation as well as the Menominee County Highway Department regarding the disposition of proposed highway widening and permitting processes along the major highways impacted by this Project (as documented in Appendix D, Exhibit 1).

American Transmission Company issued a press release on February 20, 2004, regarding the Amberg-West Marinette segment of this Project proposal. The press release was forwarded to the Michigan Public Service Commission electronically with a cover email (see Appendix D, Exhibit 3).

American Transmission Company participated in a project introduction meeting with the Public Service Commission of Wisconsin and the Department of Natural Resources on February 16, 2004 to provide an overview of this Project and the entire Northern Umbrella Plan suite of upcoming transfer capability improvement projects.

5.53 Permits

A number of agency permits are anticipated to be required for the project. An application, as provided for in Wis. Stat. § 30.025(1b) and (1e) (2003 Wisconsin Act 89, § 9), has been submitted to the WDNR for all required permits concurrently with this CPCN application. A copy of the WDNR application is included in Appendix D, Exhibit 1. Copies of the technical information used to support the application has been submitted under separate cover to WDNR with the application. ATC has not applied for any other permits at this time.

Activities affecting navigable waters require permits or approval from the U.S. Army Corps of Engineers (COE) and the Wisconsin Department of Natural Resources. Placing structures and fill in wetlands, and crossing the various rivers and tributaries would require approval of the joint permit from the COE and WDNR. Detailed information will be available for the permit application process when final engineering details are available.

a. DNR

The DNR requires a Chapter 30 (Wis. Stats.) Permit, issued jointly with the Section 404 permit, for river crossings and for filling or placing structures in or adjacent to navigable water bodies or isolated wetlands.

b. Local Zoning

The counties regulate construction within shoreland areas as defined in the Oconto and Marinette county codes. The county review of the project is done in connection with the joint COE/DNR permit process.

Permits would be required for crossing various roads in the project area. Permits for crossing town roads may require issuance of town permits. The Wisconsin Department of Transportation would require a permit for crossing any state or federal highways. The appropriate permits will be obtained for the crossing of these roadways.

c. Federal

Activities affecting navigable waters require permits or approval from the U.S. Army Corps of Engineers and the WDNR. The COE requires a permit under Section 404 of the Clean Water Act to place fill into waters of the United States, which includes connected wetlands and tributaries to navigable waters of the United States. The Rivers and Harbors Act of 1899, which prohibits the obstruction or alteration of navigable waters is also covered under the COE permitting process.

5.60 PROPERTY OWNER INFORMATION

ATC will notify all affected property owners by mail prior to any work starting in the field, and progress updates will be provided throughout the various stages of the project through restoration. A mailing list has been compiled of all the property owners along the transmission line route and is provided in Appendix E.

ATC and/or its representatives have been in contact with public officials in the impacted area which includes: city, town, county, and state officials in Oconto and Marinette counties in Wisconsin and Dickinson and Menominee counties in Michigan. In particular, officials in the cities of Niagara and Crivitz have been personally contacted, to discuss special construction challenges in their communities (as described in Section 5.07 of this document). A letter was mailed to public officials on March 11, 2004 (See Appendix F, Exhibit 1), announcing details of the scope and timing the Amberg-West Marinette portion of this project. A similar letter was mailed on June 1, 2004, to affected landowners and public officials in the area encompassed by the Plains to Stiles portion of this Project (See Appendix F, Exhibit 2).

Appendix D, Exhibits 2 to 4, contains copies of the written correspondence between ATC and agency officials. The Bay Lake Regional Planning Commission oversees long-range planning activities for the entire Wisconsin area served by this project.

Included in Appendix E are listings of public property, clerks of local units of government, and state and federal agencies with whom ATC is working. ATC will communicate with property owners and public officials throughout the term of project via direct mail newsletters, press releases, and website updates. A separate list of media outlets utilized to publish and announce press releases is also included in Appendix, E, List 2. ATC will provide copies of the lists contained in Appendices E and F electronically in Microsoft Excel or compatible format to the Commission.